From identification of compatibilities and conflicts to reaching marine spatial allocation agreements. Review of actions required and relevant tools and processes

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1. The marine conflict management sequence and its connection to the MSP steps

As the ocean is becoming more industrialized particularly because developing sectors such as aquaculture and renewable energy grow in significance, the potential for conflicts between different marine sectors is increasing over time (Ehler and Douvere, 2006). Rising conflicts between ocean users may lead to tensions that spill over to include other stakeholders and the general public (McGrath, 2004). Therefore multi-sector planning is required to optimize the use of marine space while facilitating the management of various types of conflicts that may arise. Towards this goal the concept of Marine Spatial Planning (MSP) has been developed. MSP refers to an adaptive, science-based approach that analyses current and future uses of marine and coastal areas, assesses trade-offs between these uses, and allocates space to them in a way that maximizes societal benefits (Ehler, 2008). Hence, MSP should not be restricted in defining where and what types of conflicts are occurring or might occur, but it should also be comprehensive and adaptive, and promote the resolution of such conflicts (Ehler and Douvere, 2006). Accordingly, in the framework of MSP, marine conflict management should follow a sequence of three stages: a) Detection of compatibilities and conflicts between activities at sea as well as between stakeholders during the decision making process: This means to determine which uses and activities could or could not coexist spatially. It also means to determine what and how interests, perspectives and positions of various stakeholders are; b) Prevention of conflicts: This can happen by emphasizing and fostering the compatibilities, and minimizing and avoiding spatial conflicts, in order to prevent conflicts to escalate and; c) Resolution of conflicts: When prevention is not possible, a conflict resolution process should be followed. This process implies that an agreement can be reached to maximize joint gains.

Conflict itself should be embedded as a dimension of governance where, as part of the MSP process, the conflict landscape can be mapped and identified up front. This makes the conflicts explicit in the planning process, rather than waiting for conflicts to arise as responses to management decisions (Nursey-Bray, 2013). Hence, marine conflict...
management may be required either at the planning stage or the implementation stage of an MSP or during both (Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel GEF, 2012; ICES, 2014). According to the "MSP Guide, A step by step approach" (Ehler and Douvere, 2009) these planning stages refer to steps 5 to 7 and the implementation stage refers to step 8 of the MSP process (Fig. 1).

However, while all three stages of the marine conflict management sequence may happen at the planning stage, at the implementation stage prevention seems less possible and the need for conflict resolution seems more necessary (Harte et al., 2010).

Starting from the link between the marine conflict management sequence and the specific MSP steps as shown in Fig. 1, a number of challenging questions arise that are transformed into the following objectives of this paper: a) To define and briefly present a checklist of specific actions that are required to ensure successful conflict management; b) to review existing tools and processes developed and tested so far that contribute to conflict management and to categorize them based on which stages of the marine conflict management sequence they can address; c) to assess these tools and processes based on how many of the conflict management actions from (a) they can address and their potential to be adapted and combined with one another in order to offer an integrated manner of addressing the marine conflict management sequence.

2. Actions required for successful marine conflict management

2.1. Identification and avoidance stages

2.1.1. Consideration of all of compatibilities and conflicts at both the spatial and the decision making level

One of the objectives of MSP is to make compatibilities and conflicts among human uses visible and therefore identifiable (Ehler and Douvere, 2006). Identification and understanding of the type of compatibilities and conflicts that occur already or may occur in the future, assists to the selection of conflict avoidance or conflict resolution approaches and/or mechanisms (ICES, 2014). In various studies, a number of types of conflicts and compatibilities related to marine planning are presented. Those types are either derived from literature on conflict and peace, on natural resources management, on land use planning and management or they have been detected from the observation of specific case studies related to MSP. In the present study we categorize them according to the following types:

A) Compatibilities and conflicts among activities at sea that may result from:

1. Spatial and temporal overlap between human activities at sea (Douvere and Ehler, 2009). Spatial compatibility describes the ability of different sea uses to coexist within the same physical space without incurring a disadvantage to either. It can support for multifunctional areas as targeted forms of co-use or seasonal variations in the use of space (Kannen et al., 2010; Kannen, 2014). On the other hand spatial conflict occurs when the co-use of an area is impossible due to negative effects from one use to another.

2. Positive or negative environmental externalities (ICES, 2014; Douvere and Ehler, 2009). Externalities arise when the welfare or well-being of one individual or group is negatively (or positively) affected by the decision of another group or individual that does not explicitly take these impacts into account (Sanchirico et al., 2010).

3. The ease or difficulty of access to an area by a user due to established use rights. Compatibility or conflict depends on whether a user already occupies an area and whether a user applies any property, user, management, exclusion and access rights to exclude other users from co-using that area (Eagle et al., 2008;
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